PERGAMON

Vacuum 59 (2000) VII–XIII

VACUUM
SURFACE ENGINEERING, SURFACE INSTRUMENTATION & VACUUM TECHNOLOGY

www.elsevier.nl/locate/vacuum

Contents

Volume 59 Number 1

AUTHORS		ARTICLES
	1	Preface
Reviews		
A Y Wong	5	From basic to applied plasma science
T Bell, Y Sun and A Suhadi	14	Environmental and technical aspects of plasma nitrocarburising
Plasma Sources		
Y Uesugi, T Imai, H Sawada, N Hattori and S Takamura	24	Generation of high heat flux plasmas by high power rf heating in the divertor plasma simulator NAGDIS-II
B Glocker, G Nentwig and E Messerschmid	35	1-40 kW steam respectively multi gas thermal plasma torch system
K Osaki, O Fukumasa and A Kobayashi	47	High thermal efficiency-type laminar plasma jet generator for plasma processing
M Y Ye, O Matsuda, N Ohno, Y Uesugi, M Takagi and S Takamura	55	Application of strongly ionized AC tokamak plasma for synthesis of TiN thin films
K Toyoda, K Komurasaki and Y Arakawa	63	Continuous-wave laser thruster experiment
H Sou, Y Takao, T Noutsuka, Y Mori, K Uemura and H Nakashima	73	A study of plasma propulsion system with RF heating
J L Zhang, X L Deng, P S Wang and T C Ma	80	Emission spectrum diagnostics of argon DC discharge
T Iwao, H Miyazaki, T Hayashi, T Hirano and T Inaba	88	Radiation power emitted from Ar torch short plasma as a function of in-put power in several kW
T Matsumura, Y Yokomizu and H Ohno	98	Influence of air flow velocity distribution on current interruption in flat-type arc quenching chamber
H Horisawa and I Kimura	106	Very low-power arcjet testing
R Ramasamy, V Selvarajan, K Perumal and G Shanmugavelayutham	118	An attempt to develop relations for the arc voltage in relation to the arc current and gas flow rate
J Liu, D Wang and T C Ma	126	The charged dust in processing plasma sheath
Y Gong, J Liu, X Wang and W Lü	135	Helical instability of arcs with electrical conductivity of parabolic distribution under electrostatic approximation

Plasma Processing

Y Hirata, M Fukushima, T Sano, K Ozaki and T Ohji	142	Micro-arc discharge phenomena
T Matsutani, M Kiuchi, T Takeuchi, T Matsumoto, K Mimoto and S Goto	152	Deposition of 3C-SiC films using ECR plasma of methylsilane
R Miyano, K Kimura, K Izumi, H Takikawa and T Sakakibara	159	Preparation of metal nitride and oxide thin films using shielded reactive vacuum arc deposition
D F Richards, M O Bloomfield, S Soukane and T S Cale	168	Modeling plasma processes in microelectronics
H C Dickey and T T Meek	179	Active electronic devices fabricated by DC plasma arc spray process
S Sharafat, A Kobayashi, V Ogden and N M Ghoniem	185	Development of composite thermal barrier coatings with anisotropic microstructure
A Kobayashi and T Kitamura	194	Effect of heat treatment on high-hardness zirconia coatings formed by gas tunnel type plasma spraying
T Shibata, H Tahara, T Yasui, Y Kagaya and T Yoshikawa	203	Development of electromagnetic acceleration plasma generator for titanium nitride coatings

Environmental Applications

C P Lungu, A M Lungu, Y Sakai, H Sugawara, M Tabata, M Akazawa and M Miyamoto	210	C_xF_y polymer film deposition in DC and RF fluorinert vapor plasmas
R Gasparik, N Mine, S Ihara, S Satoh and C Yamabe	220	NO_x treatment by positive streamer corona
T Fujii and M Rea	228	Treatment of NO_x in exhaust gas by corona plasma over water surface
T Miichi, S Ihara, S Satoh and C Yamabe	236	Spectroscopic measurements of discharges inside bubbles in water
K Ramachandran and N Kikukawa	244	Plasma in-flight treatment of electroplating sludge

Advance Materials and Charcterizations

M Naka, T Shibayanagi, M Maeda, S Zhao and H Mori	252	Formation and physical properties of Al base alloys by sputtering
K Niizuma and Y Utsushikawa	260	Synthesis of Fe–N gradient foil by nitrogen plasma
Y Sakuma, L Haiping, H Ueyama and H Shirai	266	High-density microwave plasma for high-rate and low-temperature deposition of silicon thin film
S Kubo, S Kurai and T Taguchi	277	Homoepitaxial growth of GaN thin layer by molecular beam epitaxy with an RF nitrogen plasma
K Kurokawa, G Ochiai, H Takahashi, S Ohta and H Takahashi	284	Effects of sputter-deposited materials (W, Ti and SiC) on interfacial reaction between $MoSi_2$ and Nb
V Gupta, R Hernandez, J Wu and P Charconnet	292	Interfacial adhesion and its degradation in selected metal/oxide and dielectric/oxide interfaces in multi-layer devices

T Kuroda 301 Helium bubble formation in YAG laser weldment of helium-implanted stainless steel

High Energy Processing and Others

Y Hashimoto and M Yatsuzuka 313 Study on smoothing of titanium surface by intense pulsed ion beam irradiation

H Uchida and M Yamashita 321 Pinhole defect evaluation of TiN films prepared by dry coating process

M Yatsuzuka, S Miki, R Morita, K Azuma, E Fujiwara and H Uchida 330 Enhanced corrosion resistance of TiN prepared by plasma-based ion implantation

X Han and M Futamata 338 Application of atomic absorption spectrometry to laser plume analysis

M Kamatani, S Ihara, S Satoh and C Yamabe 349 Laser oscillation using an inductive energy storage pulsed-power generator with plasma opening switch

M Fukao, M Ishida, Y Ohtsuka and H Matsuo 358 A simple electron gun by obstructed discharge and its discharge-sustaining mechanism

N Abe, J Morimoto, M Tomie and C Doi 373 Formation of WC-Co layers by an electron beam cladding method and evaluation of the layer properties

Volume 59 Numbers 2–3

AUTHORS ARTICLES

T Hata, K Sasaki, Y Ichikawa and K Sasaki 381 Yttria-stabilized zirconia (YSZ) heteroepitaxially grown on Si substrates by reactive sputtering

S Horita, H Nakajima and T Kuniya 390 Improvement of the electrical properties of heteroepitaxial yttria-stabilized zirconia (YSZ) films on Si prepared by reactive sputtering

K Sasaki, H Nagai and T Hata 397 Epitaxial growth properties of Si and SiGe films prepared by ion beam sputtering process

Y Yoshino, K Inoue, M Takeuchi, T Makino, Y Katayama and T Hata 403 Effect of substrate surface morphology and interface microstructure in ZnO thin films formed on various substrates

H Qiu and M Hashimoto 411 Initial growth characteristic of Ni–Cu films deposited on MgO(0 0 1) by DC-biased plasma sputtering

Y Ichikawa, H Adachi, R Ai and K Wasa 417 Effects of partial oxygen pressure on the crystal growth of $PbTiO_3$ thin films on miscut (0 0 1)$SrTiO_3$

U Heister, J Krempel-Hesse, J Szczyrbowski, G Teschner, J Bruch and G Bräuer 424 TwinMag II: Improving an advanced sputtering tool

T Seino, T Sato and M Kamei 431 650 mm × 830 mm area sputtering deposition using a separated magnet system

H Sato, M Sato, M Tagami, K Funato, M Sasaki, S Taguchi, S Mizuno and M Kobayashi	**437**	Development of biased directional sputtering (BDS) for barrier metal formation
H Seki, S Kitazawa, Y Ueno, N Wada, S Takemori, T Sato, S Uchikawa and E Setoyama	**445**	Development of a locally electron-heated plasma source
K Hidaka, S Hashiguchi, S Nagayama and P Kim	**451**	Properties of high-density (Pb, La) (Zr, Ti) O_3 ceramics for sputtering targets
Y Yoshida and H Ogura	**459**	Holey-plate plasma source for plasma processing
R Ai, K Wasa and Y Ichikawa	**466**	Magnetron sputtering cathode with confined magnetic flux
S Miyake, Y Setsuhara, Y Sakawa and T Shoji	**472**	Internal-antenna-driven inductive RF discharges for development of large-area high-density plasma sources with suppressed electrostatic coupling
T Oyama and T Yamada	**479**	Light-absorbing wide-band AR coatings on PET films by sputtering
Y Kuo	**484**	Some issues on hydrogen and hydrogenation of plasma enhanced chemical vapor deposited films in a-Si : H thin-film transistors
N Kikuchi, E Kusano, H Nanto, A Kinbara and H Hosono	**492**	Phonon scattering in electron transport phenomena of ITO films
J Strümpfel and C May	**500**	Low ohm large area ITO coating by reactive magnetron sputtering in DC and MF mode
M Nakamura, T Aoki and Y Hatanaka	**506**	Hydrophilic characteristics of rf-sputtered amorphous TiO_2 film
S Ikezawa, F Mutsuga, T Kubota, R Suzuki, K Baba, S Koh, T Yoshioka, A Nishiwaki, K Kida, Y Ninomiya and K Wakita	**514**	Basic characteristics of TiO_2 film for environmental purification deposited by electron-beam-excited plasma
D N Lambeth	**522**	Hard disk media: future problems and possible solutions
S Baba, I Mori and T Nakano	**531**	Precise determination of the refractive index of sputtered MgO thin films in the visible light range
Y Yoshino, T Makino, Y Katayama and T Hata	**538**	Optimization of zinc oxide thin film for surface acoustic wave filters by radio frequency sputtering
K Tominaga, T Murayama, I Mori, T Okamoto, K Hiruta, T Moriga and I Nakabayashi	**546**	Conductive transparent films deposited by simultaneous sputtering of zinc-oxide and indium-oxide targets
S Tamura, K Murai, N Kamijo, K Yoshida, H Kihara and Y Suzuki	**553**	Focusing efficiency of a multilayer Fresnel zone plate for hard X-ray fabricated by DC sputtering deposition
J-D Kim, K Sasaki and T Hata	**559**	Preparation and properties of Pb(Zr, Ti)O_3 thin films deposited on Ir electrodes using a sputtering apparatus

N Tajima, H Saze, H Sugimura and O Takai	567	Tribological properties of a-C : N and a-C films prepared by shielded arc ion plating
K Tominaga and I Mori	574	Relation between the flux of energetic oxygen ions and the sputtered metal atoms in oxide film deposition by reactive sputtering
T Nakano, N Ohnuki and S Baba	581	Pressure dependence of optical emission from DC magnetron sputtering plasma observed with spatial resolution
K Fukushima, E Kusano, N Kikuchi, T Saito, S Saiki, H Nanto and A Kinbara	586	Ion fraction and energy distribution of Ti flux incident to substrate surface in RF-plasma enhanced magnetron sputtering
H Biederman	594	RF sputtering of polymers and its potential application
K Okimura, T Nakamura and A Shibata	600	Mass spectrometry and absorption spectroscopy for oxidation of titanium target in rf magnetron sputtering
H Takatsuji and T Arai	606	Pinholes in Al thin films: their effects on TFT characteristics and a taguchi method analysis of their origins
Y Shigesato, R Koshi-ishi, T Kawashima and J Ohsako	614	Early stages of ITO deposition on glass or polymer substrates
Y Muraoka, K Ueda, H Tabata and T Kawai	622	Preparation and thickness dependence of magnetic properties of (1 1 1)-oriented $Mg_{1.5}FeTi_{0.5}O_4$ spinel films on sapphire by pulsed laser deposition technique
H Xu, H Zhu, K Hashimoto, T Kiyomoto, T Mukaigawa, R Kubo, Y Yoshino, M Noda, Y Suzuki and M Okuyama	628	Preparation of BST ferroelectric thin film by pulsed laser ablation for dielectric bolometers
A Masuda, J Sakai and H Matsumura	635	Novel thin-film fabrication method combining pulsed laser ablation and catalytic chemical vapor deposition: application to preparation of Er-doped hydrogenated amorphous Si films
F O Adurodija, H Izumi, T Ishihara, H Yoshioka, H Matsui and M Motoyama	641	Low-temperature growth of low-resistivity indium-tin-oxide thin films by pulsed laser deposition
M Ishihara, K Yamamoto, F Kokai and Y Koga	649	Aluminum nitride thin films prepared by radical-assisted pulsed laser deposition
S Fujimaki, H Kashiwase and Y Kokaku	657	New DLC coating method using magnetron plasma in an unbalanced magnetic field
H Anma, J Toki, T Ikeda and Y Hatanaka	665	Uniform deposition of SiC thin films on plastics surfaces
K Sasaki, T Takada and Y Yoshida	672	Silicon selective growth on partially oxidized substrate by ECR plasma CVD technique
M Niraula, D Mochizuki, T Aoki, Y Nakanishi and Y Hatanaka	678	Low-temperature growth and n-type doping of CdTe by the remote-plasma-assisted metalorganic chemical vapor deposition method
S Okuji, N Sakudo, K Hayashi, K Fujimura, Y Nishiyama, K Toyoda, S Yashima and T Ishida	686	Effect of microwave ferrite on the density distribution of microwave-superposed inductively coupled plasma
K J Yoo, S H Chi, M H Yim, S B Han, S J Choi and J H Ha	693	Dependence of metal sheet resistance on metal etch/post-etch treatment and subsequent process conditions

D Noda, T Aoki, Y Nakanishi and Y Hatanaka	701	Epitaxial growth of CdSeTe films by remote plasma enhanced metal organic chemical vapor deposition
M Shindo, Y Ueda, S Kawakami, N Ishii and Y Kawai	708	Measurements of negative ion density in fluorocarbon ECR plasma
M-A Nicolet	716	Reactively sputtered ternary films of the type TM–Si–N and their properties (TM = early transition metal)
M Kawamura, Y Abe and K Sasaki	721	Formation process of Ni–N films by reactive sputtering at different substrate temperatures
M Shimada, T Amazawa, T Ono, S Matsuo and H Oikawa	727	Ultrathin Al_2O_3 and AlN films deposited by reactive sputter using advanced electron cyclotron resonance plasma source
S Inoue, Y Wada and K Koterazawa	735	Deposition of TiC films by dual source dc magnetron sputtering
O Nakagawara, K Fujibayashi, T Makino and Y Katayama	742	Influence of H_2O partial pressure in the sputtering chamber on the crystallinity and relative dielectric constant of $SrTiO_3$ thin film prepared at low substrate temperature
C Hu, S Kotake, Y Suzuki and M Senoo	748	Boron nitride thin films synthesized by reactive sputtering
Y Song, T Sakurai, K Maruta, A Matusita, S Matsumoto, S Saisho and K Kikuchi	755	Optical and structural properties of dense SiO_2, Ta_2O_5 and Nb_2O_5 thin-films deposited by indirectly reactive sputtering technique
R Kamei, T Migita, T Tanaka and K Kawabata	764	Effect of d.c. bias on the deposition rate using r.f.–d.c. coupled magnetron sputtering for SnN_x thin films
H Yokomichi and A Masuda	771	Effects of double bonding configurations on thermal stability of low-hydrogen concentration fluorinated amorphous carbon thin-films with low dielectric constant prepared by sputtering with hydrogen dilution
T Takahashi, K Masugata, H Kawai, S Kontani and J Yamamoto	777	Surface morphology of TiN films reactively deposited by bias sputtering
H Makihara, A Tabata, Y Suzuoki and T Mizutani	785	Effect of the hydrogen partial pressure ratio on the properties of μc-Si : H films prepared by rf magnetron sputtering
E Ando, S Suzuki, N Aomine, M Miyazaki and M Tada	792	Sputtered silver-based low-emissivity coatings with high moisture durability
X-S Li, T Tanaka and Y Suzuki	800	Preparation and characterization of highly oriented $Pb(Zr,Ti)O_3$ thin films with seeding titanium layer deposited at low temperature by facing target sputtering
K Kusaka, D Taniguchi, T Hanabusa and K Tominaga	806	Effect of input power on crystal orientation and residual stress in AlN film deposited by dc sputtering
M Takahashi, M Tsunoda and H Shoji	814	Ultra-clean sputtering process for magnetic thin films on hard disk drives
F Milde, M Dimer, Ch Hecht, D Schulze and P Gantenbein	825	Large-area production of solar absorbent multilayers by MF-pulsed plasma technology
Y Tachibana, H Ohsaki, A Hayashi, A Mitsui and Y Hayashi	836	TiO_{2-x} sputter for high rate deposition of TiO_2
	844	ANNOUNCEMENT

Volume 59 Number 4

AUTHORS		ARTICLES
A Abdel-All, A Elshafie and M M Elhawary	845	DC electric-field effect in bulk and thin-film $Ge_5As_{38}Te_{57}$ chalcogenide glass
J P Joly, F Gaillard, E Peillex and M Romand	854	Temperature-programmed desorption (TPD) of water from iron, chromium, nickel and 304L stainless steel
N-T H Kim-Ngan and W Soszka	868	Effect of multiple scattering in the interaction of low-energy ions with the magnetite surfaces covered by xenon
M S Tong, G R Dai and D S Gao	877	Gas-sensing properties of PdO-modified SnO_2–Fe_2O_3 double-layer thin-film sensor prepared by PECVD technique
J C Bernède and L Assmann	885	Polycrystalline $CuInSe_2$ thin films synthesized by microwave irradiation
A B M O Islam, T Tambo and C Tatsuyama	894	Passivation of GaAs surface by GaS
V I Veksler	900	The absolute value of the degree of ionization in the electron-exchange theory of secondary ion emission of metals
T S Sheshadri	904	Anode surface temperature profile in MPD thrusters
D C York, A Chambers and A D Chew	910	Thermal transpiration of helium and nitrogen in 50-μm bore silica capillaries
S B Wang and P R Zhu	919	The formation of Ti-silicides by a metal vapour vacuum arc ion source implantation and annealing process
G Luo, P Zhu, P Chen, Z Liu, H Lin and P Qian	927	An ultrahigh vacuum chemical vapor deposition system and its application to growth of nMOSFET and HBT structures
A M Farid and A E Bekheet	932	AC conductivity and dielectric properties of Sb_2S_3 films
J Musil, J Vlček and M Růžička	940	Recent progress in plasma nitriding
	I	VACUUM DIARY
	VII	Volume Contents
	XV	Author Index